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MEMORANDUM

TO: Landsburg PRP Group D.S.M. **DATE:** September 27, 2004

FR: Douglas Morell, Frank Shuri, Golder Associates Inc. **OUR REF:** 923-1000-002.R290

RE: **Landsburg Mine**
Phase 1 Infrastructure for Contingent Groundwater Treatment System
And Discharge Alternatives

BACKGROUND

In order to provide a conservative remedy that is fully protective of human health and the environment, the Draft Cleanup Action Plan ("DCAP") for the Landsburg Mine Site includes a contingency for groundwater treatment in the event that concentrations of hazardous substances exceed applicable regulatory thresholds at the points of compliance identified in the DCAP. The contingent groundwater treatment remedy consists of two primary elements: (1) pumping groundwater from each end of subsidence trench segment containing waste materials and (2) treating this water as necessary to reduce the concentrations of constituents of concern to below required levels. The treated water will then be discharged.

These Contingent Groundwater Treatment System (CGTS) facilities will be located at the north end of the site, near the intersection of Summit-Landsburg Road and SE 253 St. If contingent groundwater treatment is required at the south end of the site, it will be pumped northward over the hill to the CGTS facilities, so that all treatment is performed at a single location. The purpose of this Phase 1 Memorandum is to identify the basic infrastructure required to support the CGTS and to evaluate several discharge alternatives. Phase 2 will design the needed infrastructure and the selected discharge alternative.

Four potential discharge alternatives were identified:

1. Discharge to Cedar River.
2. Discharge into a new sewer line connected to a municipal treatment works.
3. Discharge into on-site infiltration trenches.
4. Pump effluent into trucks, which would drive to a discharge manhole in an existing municipal system.

We have carefully considered reliability, technical implementability and costs of each of the alternatives. The preferred method is on-site pretreatment and discharge to a sanitary sewer line with multiple, redundant treatment steps before ultimate discharge to the accessible environment.

These four alternatives are described in greater detail in the following sections. For evaluation purposes, the flow rate for treated water is assumed to be 50 gpm, the maximum realistically expected without a low permeability cap installed. The flow rate with the proposed low-permeability soil cover in place, as described in the most recent DCAP, is estimated to be less than 10 gp

Installation of the infrastructure for a contingent groundwater treatment system is consistent and part of the recommended remedial alternative in the DCAP.

Rough cost estimates are provided for the capital construction of the necessary infrastructure and for each discharge alternative. Certain costs have not been included in these estimates, because they cannot be accurately defined at this time. These include, but are not limited to:

- Treatment plant equipment
- Engineering design
- Permitting
- Engineering oversight during construction.

We have examined the four conceptual designs and have developed estimated costs for the basic infrastructure for the treatment facilities. The basic infrastructure is common to all the alternatives and is included for evaluation purposes. These cost estimates are shown in the attached tables.

COMMON INFRASTRUCTURE FACILITIES

Those infrastructure facilities common to all discharge alternatives are shown on Drawing 1 and consist of the following:

1. A treatment facility area located in the cleared area adjacent to the north mine portal. This area will consist of a level, structural fill pad approximately 90 feet by 75 feet in dimension, surfaced with several inches of crushed rock. This pad will be the location of the treatment equipment (e.g., skid mounted plant), material storage sheds, pumps and main valves, electrical power supply, and similar components.
2. A parking and laydown area adjacent to the treatment facility area. Approximately 95 feet by 50 feet in plan dimension, this area will be similar in construction to the treatment facility area, and will provide space for vehicle parking and storage of equipment such as piping.
3. A security fence surrounding both the treatment facility and parking areas. For the evaluation, the fence is assumed to consist of 6-foot-high chain link mesh with 3-strand barbed wire around the top.
4. Power service, consisting of a transformer, meter, and connection panel. Power will be obtained from the 3-phase service along Summit-Landsburg Road adjacent to the site at one of the existing power poles shown on Drawing 1. All electrical equipment not mounted on the pole will be located on the treatment facilities pad inside the security fence. To determine the adequacy of the available power service, Puget Sound Energy (PSE) was contacted during this evaluation. Unfortunately, PSE cannot provide any evaluation without a formal application, and the application requires at least an intermediate level of electrical design, which will be developed during Phase 2. However, our electrical design subconsultant indicates that the anticipated loads for the treatment equipment are relatively modest, and there should be no problem obtaining the required power from the existing service line.
5. Lighting for safety and security, consisting of conventional sodium vapor lamps mounted on short poles or structures. The locations of these lights are not shown on Drawing 1,

but will be determined during detailed design. However, at least one light will be located at the site entrance.

6. Site entrance and access road. The entrance is located approximately 250 feet west of the intersection of Summit-Landsburg Road and SE 253 Street, to avoid safety problems with that intersection and provide greater line-of-sight. This is considered particularly important for large trucks, which will likely be entering and leaving the site to deliver supplies and equipment, regardless of which alternative is selected. The access road itself will be a two-lane all-weather road with a crushed rock surface. A lockable steel access gate will be installed at the site entrance.

The estimated cost for constructing these common components is about $100,000.

ALTERNATIVE 1: DISCHARGE TO CEDAR RIVER

For Alternative 1, a 4-inch-diameter high density polyethylene (HDPE) pipe would be installed below grade from the treatment plant under Summit-Landsburg Road to a discharge point in the existing surface water drainage ditch along the road. Treated water would then flow down the ditch, crossing under SE 253 St in a culvert and discharge into a natural stream channel leading to the Cedar River. These discharge features are shown on Drawing 2. The road crossing would be accomplished using small scale horizontal directional drilling (HDD) methods.

Advantages

The advantage of this alternative is that the capital cost is relatively low, adding only about $15,000 to the cost of the common facility components discussed above.

Disadvantages

The disadvantage for this alternative is that there are major uncertainties which will significantly impact implementability, reliability, cost and/or schedule. Additionally, an independent third-party treatment redundancy would not be available and there would be a complete reliance on the CGTS facility. The major uncertainties include:

1. Permitting requirements: It is likely that an NPDES permit or at least the substantive requirements would be required, which is a relatively complex process. Those requirements are as follows:

    - Permit application time
    - Establish mixing zone and discharge limits to Cedar River
    - Determine the frequency of monitoring
    - Public comment period and meetings

2. Treatment levels: There is no other treatment facility between the CGTS facility discharge and the environment; therefore treatment levels will be more critical. Because the level of treatment for direct discharge is likely to be more sensitive than for some of the other alternatives, the reliability, complexity, implementability, and operating

efficiency of the treatment system will be extremely complicated as a long-term alternative. These conditions may result in periodic downtime due to a failure of only a minor system within the CGTS facility. If a system failure occurs, this alternative would be somewhat inflexible and be more susceptible to impacts of ever changing treatment standards.

3. Public Acceptability: Any direct discharge to the Cedar River is not anticipated to be acceptable to the public because of the reliability for unacceptable discharges occurring in the short-term during upset conditions in the treatment system. The Cedar River is a valued surface water body and a discharge to the river would have to be completely reliable.

ALTERNATIVE 2: DISCHARGE INTO SEWER LINE

Under Alternative 2, the effluent from the treatment plant would be discharged through a newly constructed discharge line that would connect to an existing sewer line served by King County treatment facilities. This alternative would incorporate independent third-party treatment redundancy. Independent third-party redundancy means that the CGTS facility would discharge to a downstream sanitary sewer purveyor that then discharges to a publicly Owned Treatment Works (POTW). This allows for the CGTS facility pretreatment, and then Metro treatment which when combined employs primary, secondary, and potentially tertiary and disinfectant treatment methods. This multiple redundancy would be an integral part of the design and there would not be the sole reliance on the CGTS facility. All mine site water that may require discharge to the CGTS facility from the mine site would have multiple levels of treatment and control at all times.

As shown on Drawing 3, the discharge line would generally run along existing site roads, where Palmer Coke and Coal (PCC) has easements, to the Summit-Landsburg Road, then traverse a smaller section of King County property, and finally cross the Summit-Landsburg Road to tie into the existing sewer tightline. Where the discharge line is within PCC property or easements, it would consist of an underground 4-inch-diameter HDPE pipe; in other areas, the discharge line would possibly need to be built to King County standards. It should be noted that the pipeline route shown on Drawing 3 is conceptual; the actual pipeline location would be optimized, based on field investigations and engineering considerations, during the next phase of design, if this alternative is selected.

Advantages

The primary advantage of this alternative is that independent third-party treatment redundancy of the CGTS facility and the King County Metro treatment facilities would exist at all times. A potential failure at the CGTS facility would not result in a loss of control and treatment and the ability to discharge. The level of treatment would be more dependable and flexible in the long term. The treatment system would employ more traditional process equipment than expected for alternatives involving direct discharge of treated water to the accessible environment. Review of King County pretreatment guidelines indicates that a modest range of expected compounds could be tolerated. Consequently, pre-treatment prior to discharge will mirror traditional requirements of the sanitary sewer purveyor, and ongoing treatment methods would be more reliable, implementable, redundant and predictable.

Disadvantages

The potential disadvantages associated with this alternative include:

1. Permitting. The proposed discharge line is entirely outside of the Urban Growth Management boundary, and consequently no new sewer construction is technically allowed. However, because the Landsburg Mine is a Model Toxics Control Act (MTCA) site, connection to the existing sewer system could be accomplished under an Interim Action approved by the Washington State Department of Ecology.
2. Costs. The cost for this alternative would add about $180,000 to the capital cost of the common facility components, which is significantly higher than for the other alternatives. In addition, this estimate contains a relatively high level of uncertainty. That portion of the discharge line that is outside of PCC property and easements may need to be constructed to King County standards. Discussions with personnel from the Soos Creek Water and Sewer District indicated that the total cost of the tightline serving the general area was over $200 per linear foot. Because the discharge line from the Landsburg Mine treatment facility will likely be smaller diameter than King County's tightline, a cost of $100 per linear foot was used for this evaluation. However, the actual requirements and hence costs are not known at this time.

ALTERNATIVE 3: DISCHARGE TO ON-SITE INFILTRATION TRENCHES

In this alternative, the effluent from the treatment facility would be discharged into a series of underground infiltration trenches, to return to the groundwater regime. The layout for this alternative is shown on Drawing 4.

Advantages

The advantage of this alternative is that the capital cost is relatively low, adding only about $20,000 to the cost of the common facility components discussed above.

Disadvantages

1. Treatment levels. Similar to Alternative 1, an independent third-party treatment redundancy would not be available and there would be a complete reliance on the CGTS facility. There is no other treatment facility between the CGTS facility discharge and the environment. Because the level of treatment for discharge to groundwater is likely to be more sensitive than for discharge to a POTW, the reliability, complexity, implementability, and operating efficiency of the treatment system will be extremely complicated as a long-term alternative. If a system failure occurs, this alternative would be somewhat inflexible and be less reliable than discharge to a POTW.
2. Technical uncertainties. The subgrade soils near the treatment facilities are believed to be glacial outwash deposits and are expected to have permeabilities on the order of 10^{-3} cm/sec or higher. In this case, adequate infiltration rates can be achieved with a reasonably sized series of trenches. However, if the permeability were lower, then the required length of trenches would increase significantly.

3. Permitting requirements. Although the overall permitting process could be easier than that for Alternative 1, because all effluent remains on site, "full scale" infiltration tests are now typically required prior to issuing a permit, which could make achieving the desired schedule for this project difficult.

4. This alternative is not anticipated to be preferred by the public because of the reliability for unacceptable discharges occurring in the short-term during upset conditions in the treatment system.

ALTERNATIVE 4: TRUCKING

This alternative involves pumping the treated effluent into tanker trucks, driving to an approved manhole, and discharging the effluent into the existing sewer system served by King County treatment facilities. The facilities layout for this alternative is shown on Drawing 5 and includes the addition of holding tanks and a loop road for the tanker trucks. In addition, it has been assumed that the roadways would be paved with asphalt concrete to withstand the constant truck traffic under all weather conditions. The capital costs for this alternative would add about $40,000 to the common facilities cost.

Advantages

1. Permitting: This alternative would probably be the easiest to permit.
2. Treatment levels: As for Alternative 2, this alternative incorporates independent third-party treatment redundancy. All mine site water that may require discharge to the CGTS facility from the mine site would have multiple levels of treatment and control at all times

Disadvantages

1. This option has more environmental concerns due to the reliance on fossil-fuel burning truck haulage and truck traffic with associated air and noise impacts.

2. There is a potential for spills and leaks during loading and off-loading.

3. There is a potential for traffic accidents, injuries, and fatalities on roadways,

4. This alternative has "disproportionate cost for no incremental benefit" compared to other alternatives as defined under MTCA,

5. Operating cost: Based on the assumed maximum flow rate of 50 gpm, two trucks would need to be operated 24 hours per day, 365 days per year to dispose of the effluent. The costs for this portion of the alternative are estimated at nearly $1,000,000 per year.

SUMMARY

Effluent discharges directly to surface or ground water does not allow for independent third-party treatment redundancy. Even the most elaborate system will have periodic failures and this will not meet the goal of total containment, capture, and effective treatment sought by the Landsburg Mine site PLP Group.

Trucking the effluent, while favorable from a containment, capture, and effective treatment perspective, has a major disadvantage over any of the other alternatives. In addition to being an environmentally unfriendly solution, this alternative does not appear to be a long term solution.

Discharge into an existing sewer line has a relatively low level of technical uncertainty, and the associated pre-treatment technologies are reliable and mirror existing sanitary sewer treatment methods employed downstream. The ability of the CGTS facility pretreatment to discharge to Soos Creek treatment, and then Metro treatment which combined with the CGTS facility, employs primary, secondary, and potentially tertiary and disinfectant treatment methods. All mine site water that may potentially require discharge to the CGTS facility from the mine site would have multiple levels of treatment and control at all times.

We have carefully considered technical implementability, reliability, and costs of each of the alternatives. The preferred method is on-site pretreatment and discharge to a sanitary sewer line with multiple, redundant treatment steps downstream.